Claims

1. A composite current collector in which, after forming on a surface of a resin film a conductive treatment layer whose surface electric resistance is not higher than 1.3 Ω/cm by performing a conductive treatment, a plating layer whose thickness is at least 0.3 μm per one face is formed by an electrolytic plating treatment,

characterized in that the surface electric resistance after the electrolytic plating is not higher than 40 mΩ/cm, and additionally following expression is satisfied:

$$Y1 + Y2 + Y3 \leq 0.8 \times ((X1 + X2 + X3) \times Y3/X3)$$

where X1: thickness of resin film (μm)

X2: thickness of conductive treatment layer (μm)

X3: thickness of plating layer (μm)

Y1: weight of resin film (mg/cm^2)

Y2: weight of conductive treatment layer (mg/cm^2)

Y3: weight of plating layer (mg/cm^2).

2. A composite current collector set forth in claim 1, characterized in that a tensile strength is at least 0.8 kg/cm.

3. A composite current collector set forth in claim 1, wherein the conductive treatment layer is a conductive painted film formed by applying a conductive paint and curing it.

4. A composite current collector set forth in claim 1, wherein the conductive treatment layer is a very thin metal

thin film formed by a vapor deposition or a sputtering of a metal.

5. A composite current collector set forth in claim 3, wherein the conductive painted film is made by blending a conductive agent comprising one or at least two of Cu, Ag, Ni and conductive carbon to a resin.

6. A composite current collector set forth in claim 4, wherein the very thin metal thin film comprises one or at least two of Cu, Ag, Ni and Al.

7. A composite current collector set forth in claim 1, wherein the plating layer is one whose main component is Cu, Ni or Al.

8. A composite current collector set forth in any of claims 1 - 2, wherein the resin film is wavy or one in whose surface there has been formed an irregularities pattern.

9. A composite current collector in which conductive treatment layers are formed on both faces of a resin film having many through-holes, characterized in that, after forming a plating layer on the conductive treatment layer by an electrolytic plating treatment, a surface electric resistance is not higher than 40 mΩ/cm, a tensile strength higher than 0.8 kg/cm and a front/back current-carrying resistance not higher than 100 mΩ, and additionally following expression (2) is satisfied:

$$Y1 + Y2 + Y3 \leq 0.8 \times (X1 + X2 + X3) \times Y3/X3 \cdots (2)$$

where X1: thickness of resin film (μm),

X2: thickness of conductive treatment layer (μm),

X3: thickness of plating layer (μm),

Y1: weight of resin film (mg/cm^2),

Y2: weight of conductive treatment layer (mg/cm^2),

Y3: weight of plating layer (mg/cm^2).

10. A composite current collector set forth in claim 9, characterized in that the through-hole is filled by the conductive treatment layer.

11. A composite current collector set forth in claim 9, characterized in that the conductive treatment layer is formed also in a section of the through-hole, and additionally a plating layer is formed in an upper layer of the conductive treatment layer.

12. A composite current collector set forth in claim 9 or 11, wherein the plating layer is one whose main component is Cu, Ni or Al.

13. A composite current collector set forth in claim 9, wherein the resin film is wavy or one in whose surface there has been formed an irregularities pattern.